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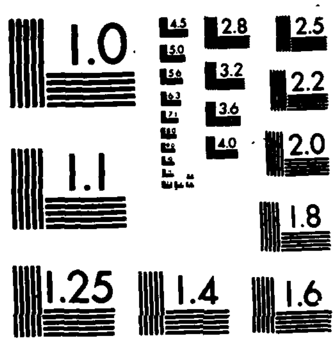

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PETER D. ENGELMANN AND CHARLES F. GETTYS

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DECISION PROCESSES LABORATORY
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Act generation is a process used by decision makers to create a set of possible actions that might solve a problem. Since previous research had shown college students to generate incomplete sets of possible actions in act generation, the sets of actions generated by experts were examined in the first of two experiments to see if they were more complete. In the first of the two experiments, graduate psychology students were given an act generation task on a subject at which they were expert. Verbal behavior was recorded to aid in the description of expert performance. In the second experiment the same graduate psychology students were given a task at which their expertise should be of little or no value and were compared to a group of undergraduates. Measures of act generation performance in both experiments included measures of quantity and quality of actions generated.

Graduate psychology students serving as experts in the first experiment excelled in terms of the quality and the quantity of the generated actions. Their performance was markedly superior to the performance found of non-experts in previous experiments on act generation. In the second experiment, where expertise was not an issue, graduate psychology students again excelled as compared to the undergraduates. One clue that may account for the large performance differences observed between the two groups in the second experiment is divergent thinking ability. This ability, as measured by Guliford's "Alternate Uses" test, was approximately twice as high for the graduate student subjects as compared to the undergraduates.

Since excellent act generation performance of graduate psychology students was found in tasks at which they were either expert of non-expert, divergent intellectual ability was implicated as the source of their excellence. In conclusion, while high intellectual ability was shown to be valuable in generating a nearly exhaustive set of actions, the issue of the effect of expertise on act generation performance remains unsettled.

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Ability and Expertise in Act Generation

This paper investigates the ability of experts to generate actions that might solve a realistic decision problem. The divergent production of actions, which we call act generation, involves the creation of a set of options for action for a decision maker's further consideration prior to decision. Research on act generation in realistic decision tasks using college students has demonstrated that these individuals rarely generate all actions worth considering (Casey, Gettys, Pliske, and Mehle, 1982; Gettys, Manning, and Casey, 1981; Pitz, Sachs, and Heerboth, 1980). This basic result has been replicated in several studies (Gettys, Kelley, Pliske, and Beckstead, 1983). In one study, Pliske, Gettys, Manning, and Casey (1982) demonstrated that substantial monetary incentives did not enhance quantity or quality of act generation performance.

Are all decision makers impoverished act generators? Experts are reputed to make better decisions than non-experts in their area of expertise. Do they also excel when generating actions that might solve a decision problem? The generation of actions is important to the expert as it is to the non-expert. When experts fail to generate the best solutions to a problem, the utilities of their chosen solutions, regardless of their evaluative abilities, will be restricted to the range of utilities of actions in the act sets generated. Thus, experts, despite superior evaluative abilities, may not make the best decisions if they generate incomplete sets of actions. Given the important implications of the results obtained with college students, it seems worthwhile to address the extent to which experts generate a complete set of actions in a realistic decision problem.

While expertise has not been investigated in act generation, it has been studied in hypothesis generation. Hypothesis generation, which is closely related to act generation, is a divergent production task in which the decision maker attempts to generate all possible explanations for given data or information. Research comparing experts and non-experts in hypothesis generation has shown experts--auto mechanics (Mehle, 1982) and curriculum advisors (Gettys, Mehle, Baca, Fisher, and Manning, 1979)--to be nearly as impoverished as non-experts.

Who is an expert? By definition, an expert is an individual who knows far more about a problem than does the average individual (Schlaifer, 1969). Experts may differ from non-experts because they have a large knowledge base that can be accessed to solve new problems by using familiar knowledge (Britton and Tesser, 1982). Experts may differ depending on the different kinds of knowledge required for different tasks. For some tasks subject-matter knowledge may be all that is necessary, as in an anatomy textbook exam. These experts need only subject-matter expertise (Lichtenstein and Fischhoff, 1977). Content knowledge of an anatomy textbook, however, does not make an anatomy student an expert surgeon. Expert surgeons, in addition to the substantial subject-matter knowledge required to perform their tasks, also need procedural knowledge in order to operate (Newell and Simon, 1972). Also, a theoretical expert must have knowledge in the theory of a task (Newell and Simon, 1972), which a skilled surgeon may not require. Thus, expertise is multi-faceted and the type of expertise necessary depends on task requirements. Given most tasks, the decision maker generally has some of each of these kinds of knowledge: subject-matter, procedural, and theoretical. The ideal expert, of course, would be a well-rounded one with considerable knowledge in all three domains of expertise and would be expert at almost any decision task in his or her area of expertise.

For the first experiment, we searched for a population of experts and a realistic and motivating decision problem combination so that our subjects approximated well-rounded experts. We chose graduate psychology students as subjects for a problem involving graduate psychology student recruitment and retention. For this problem, which we call the "Graduate Department Problem," the graduate student subjects were asked to generate actions designed to insure that the University of Oklahoma's graduate psychology program would maintain an abundant supply of highly talented and motivated graduate students in the 1980's. This problem was clearly intrinsically motivating and realistic. The graduate student subjects approximated well-rounded experts because they deal with most aspects of this problem daily. One disadvantage of this task is the subject-matter expertise required to perform it. Because non-experts do not possess the subject-matter knowledge needed to attempt this task, non-experts could not be compared with the expert graduate students in this study. Thus, the first experiment presented in this paper will only examine the act

generation performance of experts compared to a lower-bound estimate of optimal performance. Subjects were given an extended period to work on the problem to more nearly approximate the act generation process of experts.

Method

Subjects. Subjects were 14 experimental psychology graduate students with at least two years of experience in a graduate program. Subjects were paid approximately 5 dollars per hour for their participation in the experiment and were told that the ideas they generated would be used by the Graduate Studies Committee of the department.

Procedure. This experiment was divided into two phases: act generation and act evaluation. The act generation phase was subdivided into two sessions. In the first session, 12 subjects exhaustively generated actions as solutions for the "Graduate Department Problem." Between the first and second sessions, subjects were asked to think of more actions to solve the problem. Subjects were given a week between sessions for this task. The second session of the first phase was used to collect the actions generated during this intersession period. At the end of the second session, subjects were also asked to describe their intersession act generation behavior.

In the second phase, the act evaluation phase, subjects performed a multi-attribute utility analysis on the acts generated in the first phase.

Phase 1.

Each of 12 subjects was given the following problem:

> "The Graduate Studies Committee is currently engaged in an exhaustive study of our graduate program because they realize that what worked in the 1970's will not necessarily work in the 80's. The success of O.U.'s graduate psychology program in the past has been due, to a large extent, to the number and quality of graduate students. What do you think can be done to insure that we can continue to have an abundant supply of highly motivated and talented graduate students?

Subjects were asked to read the problem and to restate it in their own words so that the experimenter could be sure that they had understood the problem. Next, subjects were asked to generate all plausible actions they could think of which could be taken to solve the problem. As actions were generated, subjects were also asked to generate the various plausible outcomes associated with each action. Since subjects were given unlimited time to complete this task, they generated actions and their associated

outcomes until they explicitly stated that they had run out of ideas. Subjects were then asked to continue their act generation task because previous research had shown subjects to be capable of generating further solutions after they had indicated they were finished.

Verbal behavior of subjects in the first session was tape recorded and the experimenter kept a written record of acts generated. All subjects continued with the act and outcome generation task until they stated once again that they had run out of ideas. When subjects had stated that they had run out of ideas for the second time, the first session was then concluded and subjects were given continuation instructions.

Subjects were asked in the continuation instructions to continue to work on the problem until the next experimental session. They were also asked to keep a log book of any additional solutions (actions and outcomes of actions) to the problem and the circumstances under which they were conceived.

The second experimental session was scheduled at least a week later for all subjects. During this session, subjects were asked for their log books and were asked to describe the circumstances surrounding the generation of new actions and associated outcomes. Subjects were also asked how much time they spent on the problem between the two sessions.

Phase 2

Since many of the actions generated by the subjects were similar or equivalent, one of the authors and another experimenter independently eliminated duplicate actions. The elimination of duplicates was necessary to obtain a set of unique acts for the utility analysis phase. Any actions that were considered duplicates by both experimenters were combined into a single action. If experimenters disagreed, actions were kept separate. This process reduced the number of raw actions to 180 unique actions.

After the unique acts were determined, subjects were asked to rate the best 60 actions. The utility rating procedure used was the Simple Multi-Attribute Rating Technique (SMART) developed by Edwards (1976). To obtain utility ratings using SMART, the attributes to be measured must be identified. The SMART procedure typically has subjects generate the attributes to be rated. We varied this procedure by giving our subjects four attributes of importance and inviting them to add any other attributes that affect the utility of the actions. The four attributes given were:

quantity of students, quality of students, motivation of students, and cost. The cost attribute included time, effort, and money. None of the subjects added another dimension and all felt satisfied that the four provided dimensions were sufficient for a proper utility analysis. Subjects were then instructed to rank order the attributes according to their contribution to the total utility of actions. Next subjects were asked to scale the attributes using Stevens' (1958) magnitude estimation procedure with the most important attribute assuming a modulus value of 100, and the other three attributes values less than or equal to 100. These values serve as the relative importance weights for the attributes.

Subjects were then given 180 index cards, each with one of the unique actions and the appropriate category heading for each action (the category headings were determined by two graduate psychology students not used in the act generation phase). Subjects were instructed to sort the cards into three piles: "actions that definitely should be considered for implementation," "actions that might be considered for implementation," and "actions that are not worth considering for implementation." They were told that the goal was to end up with the 60 best actions in their "best" pile. After this task was completed, the attributes were reviewed with the subject; again the subject was asked if the attributes given are those needed to determine the utility of the actions. Subjects could also adjust their importance weights for the attributes at any time.

Finally, subjects were asked to measure the location of each action on the dimension of value for each attribute. They were also instructed to use an interval scale in their rating of the actions. After subjects had rated five actions, the experimenter reviewed the values assigned to the attributes for each action with the subjects. This was necessary to insure that subjects were using an interval scale. When the subjects had rated all actions in their "best" pile, they were finished with the experiment.

Results

In the first session of Phase I subjects generated 364 raw actions to the Graduate Department problem as a group--30.3 actions per subject. Time for task completion ranged from 20 to 140 minutes with the modal subject taking about 90 minutes.

Over the intersession interval, subjects thought of 28 more raw actions or 2.3 actions per subject. In the two sessions combined subjects

generated a total of 392 raw actions as solutions for the graduate department problem with an average of 32.6 actions per subject.

Of the average 32.6 raw actions generated by each subject, 26.0 were considered unique. The range of unique acts generated was 11 to 63. Subjects in the present experiment generated approximately twice as many actions as subjects in previous act generation experiments using a different problem (Gettys, Manning, and Casey, 1981). These previous subjects generated a mean of 12 acts per subject with a range of 2 to 35 acts. Experts in the present experiment clearly generated more actions than non-experts in previous experiments although a different problem was used.

However, the quality of act generation performance not determined solely by number of actions generated. A good act gener r should also be able to generate actions in a variety of categories--nc only the typical but the atypical as well.

To evaluate the quality of generated actions, ey were first classified in a hierarchical tree representing the logical relationships among the various actions. The construction of a hierarchical tree, which we will call an act tree, is described in detail by Gettys, Manning, and Casey (1981), but the gist is presented here.

In the construction of our hierarchical tree, actions were classified according to their specificity. Actions were assigned a classification of "limb," "branch," or "twig." We call broad categories of actions "limbs," major actions within the broader categories "branches," and specific ideas for action "twigs." For example, subject 3 in the "Graduate Department" problem generated the specific act "Offer a writing seminar," a twig. This twig is a subset of the branch "Improve departmental curricula," and this branch is a subset of the limb "Educate students and faculty."

The generation of broad categories of actions, represented by the limbs of an act tree, gives an indication of the **breadth** of act generation performance. The generation of major branches on each limb gives an indication of the **depth** of performance.

The tree used in this analysis is but one of several that could be constructed from the data. Although different problem representations yield somewhat different act trees, Manning(1981) demonstrated that different representations of the same data yield very similar measures of

performance.

To evaluate individual performance, individual act trees were compared with an act tree representing a lower-bound estimate of optimal act generation performance. This act tree, which we will call the "optimal tree," was constructed by pooling the actions of all subjects. The estimate is lower-bound because the pooling of actions generated by additional subjects would increase the estimate. We can assess individual performance by comparing individual act trees to the "optimal tree."

We constructed the "optimal tree" to serve as a yardstick against which the breadth and depth of individual performance may be assessed. In comparison to this yardstick, a good act generator should have most of the "optimal" limbs and important branches contained in his own act tree. The "optimal" tree for the "Graduate Department problem" is shown in Appendix 1.

Comparison of individual act trees with the "optimal tree" showed that subjects generated twigs and branches on almost every limb of the "optimal tree." Limb 2, "Ways to improve non-academic life," is the only limb on which a subject failed to generate at least one action. Still, 9 of the 12 subjects generated at least one action on limb 2. Most acts generated were on limb 4, "Ways to educate students and faculty." Actions on this limb were generated 4 times as often as actions on limb 2. The most outstanding performance in this experiment was by Subject 3 who not only generated the largest number of acts overall, but also generated more acts on each of the limbs than did any other subject.

There was great variability in individual performance for generating branches but not for generating limbs. The worst subject generated actions on 4 limbs and 8 branches while the best generated on 5 limbs and 26 branches.

In addition to breadth and depth, a good act generator should also produce a number of quality ideas. The second phase of this experiment was used to collect information on act quality.

The utilities of actions, obtained in Phase 2, were assigned to the twigs of the tree. The utility for any branch was then determined as equal to the largest utility of any twig on that branch. Correspondingly, the utility for each limb was determined to be equal to the largest utility of any branch on that limb. Branch utilities ranged from 10.9 for the branch "Ways to improve the social environment" to 60.7 for the branch "Ways to

increase tangible motivation." Median branch utility was 37.8. Limb utilities ranged from 19.3 for limb 2 , "Ways to improve non-academic life," to 60.7 for the limb 3, "Ways to motivate students and faculty."

All subjects also generated at least several high quality actions. The act "Give students more money" had the largest utility, 60.7, and was generated by 10 of the subjects. All subjects also generated several high utility branches, and 9 subjects generated at least one high utility branch on every limb.

Previous act generation studies have looked at the completeness of performance through the use of a performance score (See Gettys, Manning, and Casey, 1981 for development). This score is an accumulation of utilities for acts generated, summed in order of decreasing value. The utility for the best action generated is added to the utilities of the second, third, fourth, etc. most useful actions generated. Thus, there is a performance function as the set of actions increases in size. A comparison of individual performance scores with the "optimal" performance scores (obtained from act sets of the "optimal tree") for act sets containing up to 10 actions gives an indication of completeness of performance.

Since we did not use an extensive measurement procedure, we recognize that the performance score of a set of actions is not the utility of the set. It is, instead, a measure of the generation of high utility actions. An individual performance score that approximates the performance score derived from the optimal tree indicates the generation of many of the highest quality actions that might be generated by an individual.

Figure 1 shows the performance scores for act sets in terms of limbs generated (breadth) and limbs and branches generated (depth) from both the graduate department problem used in this experiment, and from the living problem, used in a previous act generation experiment (Gettys, Manning, and Casey, 1981). It is clear from this figure that the performance by non-expert subjects on the living problem was substantially inferior to the performance by experts on the graduate problem when each is compared to the performance of their respective "optimal" estimates. In fact, the best expert is remarkably complete in comparison to the "optimal" function.

This experiment shows that graduate student subjects, performing a task on which they were expert, were dramatically different from non-expert

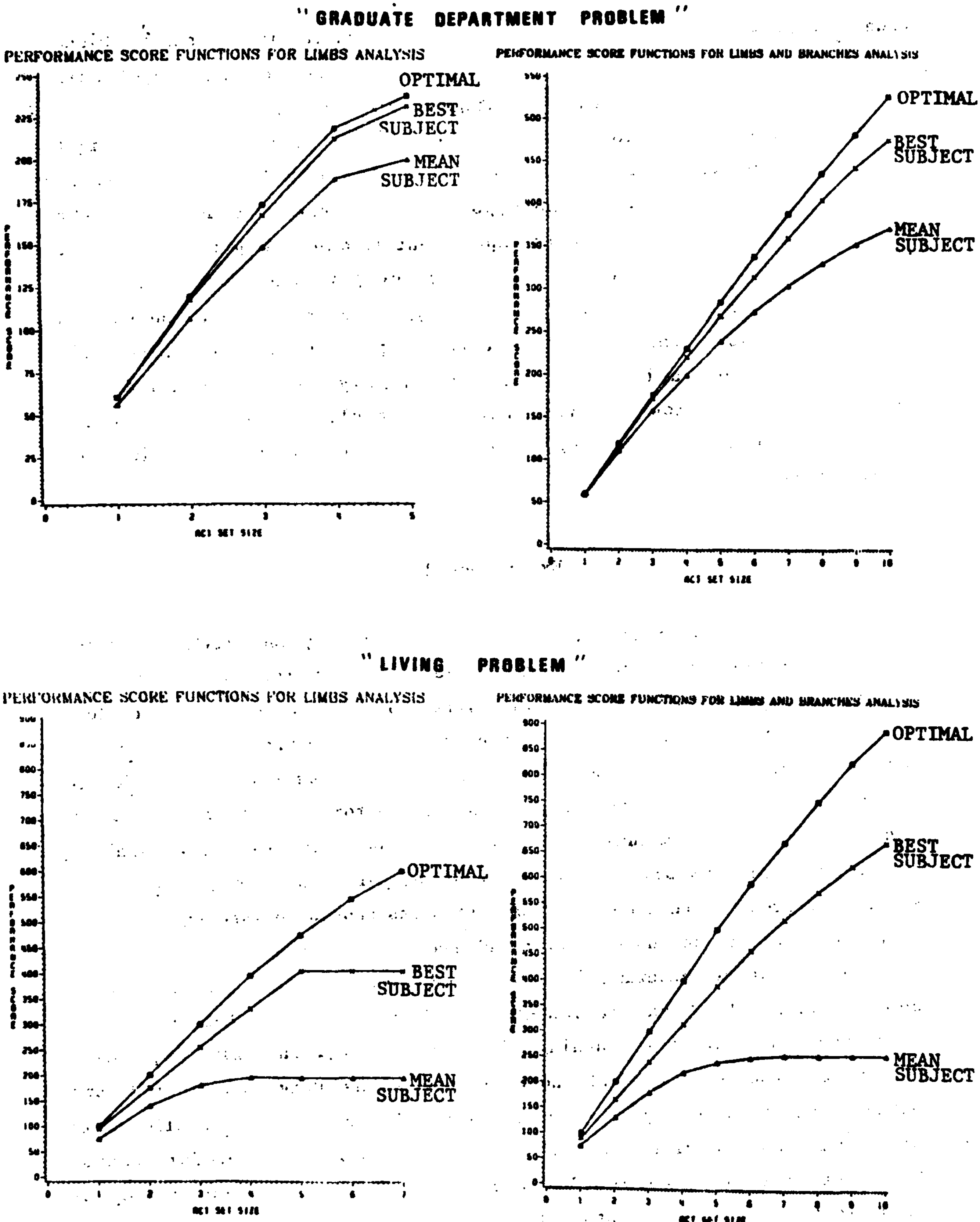

FIGURE 1. COMPARISON OF PERFORMANCE SCORE FUNCTIONS FOR EXPERTS ON THE "GRADUATE DEPARTMENT PROBLEM" AND NON-EXPERTS ON THE "LIVING PROBLEM" (FROM PREVIOUS RESEARCH). THE GRAPHS ON THE LEFT SHOW FUNCTIONS FOR LIMBS GENERATED AND THE GRAPHS ON THE RIGHT SHOW FUNCTIONS FOR LIMBS AND BRANCHES GENERATED.

undergraduates on a number of quantitative and qualitative measures. Since these results are considerably different from those found in hypothesis generation experiments, further investigation was warranted.

The exceptional performance by the subjects in this experiment might be due to expertise. Expertise, however, was not shown to result in exceptional performance in the hypothesis generation studies. If the exceptional performance in this experiment is due to expertise, then it would indicate that experts are better act generators than they are hypothesis generators. Another possibility, however, is that the experts used in this experiment are different than experts used in the hypothesis generation studies because they are highly selected and talented individuals. Exceptional performance, then, could be due to the superior divergent thinking ability of the graduate student population aside from their expertise.

Experiment 2

To examine whether the outstanding performance by the graduate student subjects in the first experiment was due to expertise, differences in divergent thinking ability, or a difference in the nature of the problem, they were given a new act generation task in which their expertise was largely irrelevant. We reasoned that if previous performance was due to expertise, then the graduate students should perform no better on this new task than the undergraduates. If, however, superior divergent thinking ability was responsible for the exceptional performance on the graduate department problem, then the graduate students should perform equally well on the new task as on the task at which they were expert.

For the second experiment, then, a problem for which neither subject population should be expert was chosen. The "Living Problem" fulfilled this requirement (Gettys, Manning, and Casey, 1981). The "Living problem" depicts a Canadian student attending school at the University of Oklahoma without sufficient money on which to live. The student is not allowed to work by regulation of the U.S. Immigration Service and therefore cannot take a regular job. The goal is to generate as many different actions as possible that the Canadian student could take to solve his living problem.

Both groups were also given a test of divergent thinking ability.

This was the "Alternate Uses" test (Christensen, Guilford, Merrifield, and Wilson, 1960) which measures a subject's ability to think of a number of alternate uses for common objects. If graduate students are superior divergent thinkers they should demonstrate superior performance on this test.

Method

Subjects. Subjects were 12 introductory psychology students and 12 graduate experimental psychology students used in the first experiment. Introductory psychology students received partial course credit and graduate students earned five dollars per hour for their participation in this experiment.

Procedure. Subjects participated in this experiment through interaction with a computer and were required to pass a twenty word-per-minute typing test. Subjects were given specific instructions for the experimental task on a CRT display.

Instructions covered the procedure of the experiment and use of the computerized menu for directing this procedure. The instructions emphasized the need for subjects to be complete in their responses by generating every possible solution to the problem they were to receive. Subjects were told not to terminate the experiment without trying to think of more solutions even when they had run out of ideas.

The instructions also explained the use of the computer's menu to the subject. Using this menu, a subject was able to 1) Review their experimental instructions, 2) Display the problem, 3) Enter a new action, 4) Terminate the experiment, and 5) Obtain help on any aspect of the menu.

After presentation of the instructions, subjects were given a practice problem followed by the experimental problem. The experimenter helped them with the practice problem and did not allow subjects to move on to the main problem until it was clear that they understood the experimental procedure. The practice problem consisted of generating actions which might be taken if one ran out of gas on a freeway and had no money.

To enter their actions, subjects first selected the appropriate key from the menu described above (an "E" in this case). After they had typed in an action, subjects were asked to explain why taking this action might achieve the desired goal. This explanation was useful to us in classifying actions. After a subject had explained his or her action, he or she

returned to the menu and tried to think of another action.

After completing the practice problem, subjects were shown the same exemplar actions generated by another subject for the same problem. This was done to encourage them to think of as many actions as possible.

Subjects were then given the main experimental problem. They were told that there was only one main problem and that they were to give it their best effort. They were also told that they had as much time as needed to think of every possible solution. When subjects indicated that they were done with the experiment, they were asked to assess the number of reasonable solutions remaining.

After completing the main experimental problem, subjects were given the "Alternate Uses" test. Fifteen minutes were allowed for completion of this test.

Results

The responses of both groups were analyzed using the "optimal tree" for the "Living Problem" (see Appendix B) and associated utility values established in previous research (See Gettys, Manning, and Casey, 1981).

Results using the "Living Problem" show that graduate students generated a total of 60% more raw acts than the undergraduates, 213 to 127 respectively. The mean number of branches generated was 8.0 for the graduates and 4.9 for the undergraduates. The mean generation of limbs was 5.0 for the graduates and 3.2 for the undergraduates. Only four undergraduates generated as many limbs as the worst graduate act generator.

The median assessment of the number of reasonable actions left to be thought of was 4 by the graduate students and 5 by the undergraduate students.

The Alternate Uses test was scored by two independent raters and each subject was given a score for quantity and a score for quality of the different uses generated. The correlation between quantity and quality scores was .99, so only the quantity score was used for analysis. The median graduate score was 56.2 compared to 30.0 for the undergraduates. Variability of scores also differed for both subject populations with the scores of the graduates varying considerably compared to the scores of the undergraduates with standard deviations of 62.0 and 9.7 respectively. Analysis of the Alternate Uses scores for the graduate and undergraduate

groups using a Mann-Whitney U, a non-parametric test of ranks, revealed a significant difference ($p < .005$) between the groups. Thus, the graduate students generated considerably more alternate uses than did undergraduates.

Correlations of "Living Problem" limb and branch performance scores and limb performance scores with Alternate Uses test performance (using both subject populations) were .43 and .49 respectively. Ability to generate alternate uses for objects, then, is positively correlated with the ability to generate acts as solutions to the "Living Problem." A similar relation was found in a hypothesis generation experiment wherein the ability to generate alternate uses for objects was positively correlated with the ability to generate hypotheses (Manning, Gettys, Nicewander, Fisher, and Mehle, 1980).

It seems quite clear from these results that the graduate students are better divergent thinkers than are the undergraduates.

This conclusion is emphasized by the performance scores comparison depicted in figure 2. From this graph one can see that the average graduate student performed far better than the average undergraduate, with the performance of the best graduate subject once again closely approximating "optimal" performance. These performance score graphs may also be compared with those shown in figure 1.

Comparison of the two figures shows that relative to "optimal" performance, the nearly complete performance of the non-expert graduate subjects on the "Living Problem" is highly similar to their expert performance on the "Graduate Department Problem." Thus it appears that graduate performance is about the same on problems at which they are either expert or non-expert.

It might be argued that the graduate subjects, by virtue of their greater experience, were actually more expert at this problem. Under this assumption, one would predict that older students would perform better than younger ones, the older students being exposed to more varied living conditions. Correlation of age with act generation did not support this prediction, however. The correlation of age and limb performance scores within groups was -.08 for the graduate subjects and .22 for the undergraduates. However, there was no overlap in the ages of the two subject populations so to examine this issue further the ages of 60 subjects, ranging from 19 to 30 years, were correlated with their

"LIVING PROBLEM"

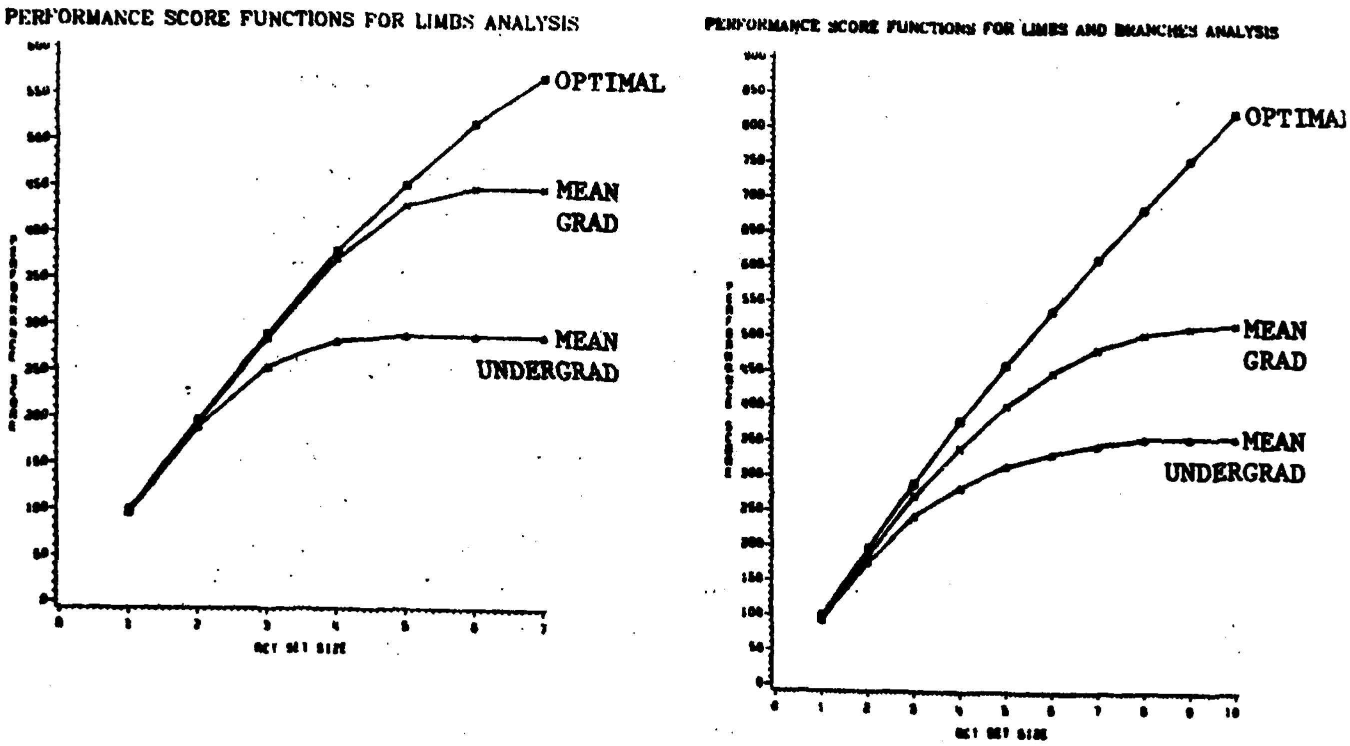

FIGURE 2. PERFORMANCE SCORE FUNCTIONS FOR LIMBS GENERATED AND FOR LIMBS AND BRANCHES GENERATED ON THE "LIVING PROBLEM" BY GRADUATE AND UNDERGRADUATE SUBJECTS (EXPERIMENT 2).

performance scores obtained in a previous act generation experiment which utilized the "Living Problem" (Gettys, Kelley, Pliske, and Beckstead, 1983). Again, the correlations were both low, -.05 with branch performance scores and -.02 with limb performance scores, indicating that differences in experience as a function of age are not responsible for superior performance by the graduate students. Guilford (1967) also found no correlation of age and divergent thinking ability. In addition, the generation of hypotheses has been found not to be correlated with retrieval of hypotheses from episodic memory (Manning, Gettys, Nicewander, Fisher, and Mehle, 1980), counter to the idea that older subjects might be aided by a search of episodic memory.

Discussion

Possibly the poorer hypothesis generation performances by auto mechanics and curriculum advisors was due to average divergent thinking ability of these groups. On the one hand, the auto mechanics and curriculum advisors used in the hypothesis generation study were not hired for their divergent thinking ability. On the other hand, the graduate students were admitted to graduate school and 11 had been selected as PhD candidates at that time partially on estimates of their creativity. It seems plausible, therefore, that the superior performance of the graduate students was due to superior divergent thinking ability and not expertise. This notion is consistent with the expert and non-expert data found in both hypothesis and act generation studies.

These results do not mean that expertise is of no value as there are many tasks that require subject-matter, procedural, or theoretical expertise to be carried out. However, any effect of expertise present in the first experiment was overpowered by the superior divergent thinking ability of the graduate student population. Though the results of our study suggest that expertise is of little or no value in act generation, verification is desirable. A future study using experts and non-experts controlled for divergent thinking ability would be appropriate.

These results do demonstrate the importance of divergent thinking ability in act generation. The undergraduate subjects, by virtue of their admission to the university, are undoubtedly somewhat superior to the general population. The graduate students, having survived three further

selection processes--completion of an undergraduate degree , admission into graduate school and then into the PhD program--, are the narrow tip of the selection pyramid. The graduate students do an admirable job of act generation; obtaining a level of performance reached only by an occasional undergraduate. In fact, divergent thinking ability has a far larger impact than any of the other variables examined in the previous act generation studies.

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APPENDIX A

Act Tree Structure for Graduate Department Problem

1. Attract quality individuals to the program.

1.1 Hire better faculty.

1.1.1 Hire famous faculty.
1.1.2 Hire more faculty.
1.1.3 Increase the number of visiting faculty.
1.1.4 Hire qualified faculty.

1.2 Improve advertising.

1.2.1 Have someone attend Psi Chi meetings to advertise.
1.2.2 Create a pamphlet to use in advertising.
1.2.3 Conduct experiments at places other than O.U to advertise our work.
1.2.4 Advertise honors and awards earned in the department.
1.2.5 Advertise the program more effectively.
1.2.6 Advertise the uniqueness of the program.
1.2.7 Advertise by interacting with the press.
1.2.8 Advertise the department.
1.2.9 Promote the university and the program.

1.3 Improve the departmental recruiting system.

1.3.1 Make contacts at other schools and have them encourage other students to apply here.
1.3.2 Recruit by sending letters to psychology majors in Psi Chi.
1.3.3 Actively recruit at psychological conferences.
1.3.4 Recruit from O.U.
1.3.5 Hire a recruiter of students.
1.3.6 Focus on certain undergraduate schools and actively recruit.
1.3.7 Recruit from outside Oklahoma.
1.3.8 Recruit from good quality undergraduates.
1.3.9 Personally recruit individuals.
1.3.10 Advertise the quality of the department by sending representatives to various colleges.

1.4 Improve the new student selection process.

1.4.1 Evaluate BA's and MS's to see which students are more successful and admit more students of that type.
1.4.2 Have prospective students send in letters that tell more about them.
1.4.3 Have prospective students come to O.U. and play games so that we can tell which ones are motivated and talented.
1.4.4 Have interviews with prospective students.

1.4.5 Invite prospective students like we invite prospective faculty.
1.4.6 Check the compatibility of prospective students with the department.

1.5 Provide more information to prospective students about the program.

1.5.1 Have the faculty list publications and interests.
1.5.2 Specifically tell undergraduates how to apply.
1.5.3 Give potential students details about the program.
1.5.4 Increase faculty and student contact with the undergraduates.
1.5.5 Have a Graduate Student Day like High School Day.

1.6 Change admission standards.

1.6.1 Admit more students.
1.6.2 Admit more students but cut more too.
1.6.3 Re-define what we mean by a quality student.

1.6.4 Stiffen the standards of admission.
1.6.5 Look closer at GRE scores.
1.6.6 Change standards of admission for the university.

1.7 Increase the number of potential applicants.

1.7.1 Obtain a large sample of applicants.
1.7.2 Retain the ability to submit names of prospective students.

1.8 Improve undergraduate skills.

1.8.1 Sponsor an undergraduate paper conference.
1.8.2 Prepare students better before they apply to our program.

2. Improve non-academic life

2.1 Improve the campus environment.

2.1.1 Make parking easier by giving students parking stickers.
2.1.2 Have a restaurant.
2.1.3 Make Norman a showplace of the world.
2.1.4 Make sure students have good housing.
2.1.5 Make the environment more pleasant.
2.1.6 Support Norman and the university as a whole.

2.2 Improve the social environment.

2.2.1 Create a department newsletter.
2.2.2 Have more social functions.
2.2.3 Increase contact with other students.
2.2.4 Increase social contact.

3. Motivate students and faculty.

3.1 Improve the departmental environment.

3.1.1 Restrict smoking in the department.
3.1.2 Get a graduate student lounge.
3.1.3 Increase space.

3.2 Increase tangible motivation.

3.2.1 Make sure students are paid on time.
3.2.2 Offer more money to students.
3.2.3 Set up a reward system.
3.2.4 Waive tuition for good students.
3.2.5 Motivate students.
3.2.6 Increase the services for students such as health insurance.

3.3 Improve general departmental services.

3.3.1 Increase the availability of materials such as typewriters.
3.3.2 Provide maximal access to computers.
3.3.3 Hire someone to do the graduate students' typing.

3.4 Increase student policy involvement.

3.4.1 Let students have some input into departmental policies.
3.4.2 Encourage students to sit on faculty committees.
3.4.3 Create a suggestion box.

3.5 Increase student responsibilities.

3.5.1 Mold students into higher quality ones.
3.5.2 Increase the responsibilities of students with time.
3.5.3 Punish students for not publishing.

3.6 Improve office assignments.

3.6.1 Let students pick their own office mates.
3.6.2 Pair old students with new students for office assignments.

3.7 Improve assistantship assignments.

3.7.1 Have students rotate assistantships.
3.7.2 Equate assistantships in time and effort.
3.7.3 Change titles of student academic jobs.
3.7.4 Assign undergraduate assistants to students.
3.7.5 Give assistantship assignments earlier.
3.7.6 Allow for more flexibility in choosing assistantships.

4. Educate students and faculty.

4.1 Improve library facilities.

4.1.1 Improve the quality of the library.
4.1.2 Let graduate students use topic literature searches.
4.1.3 Make sure that students can use the library.
4.1.4 Make a title/call number list of journals related to psychology that are in the library.
4.1.5 Allow student access to requesting articles through Current Contents.

4.2 Improve program orientation and information.

4.2.1 Designate an individual as the one to go to with problems.
4.2.2 Set up an index of faculty in other departments that could serve on someone's dissertation committee.
4.2.3 Start a program to orient new students.
4.2.4 Expand the intro to grad study course.
4.2.5 Delineate the course of the program and the students' roles and responsibilities.
4.2.6 Specify the length of a student's stay in the program.
4.2.7 Cross-list courses.
4.2.8 Start an orientation program and handbook for new students.
4.2.9 Append the graduate student handbook to make it more informative.
4.2.10 Have a place to go to find information about what's required of a new student.

4.3 Improve existing faculty.

4.3.1 Improve faculty knowledge.
4.3.2 Get the faculty to publish more.
4.3.3 Emphasize pilot research among faculty.
4.3.4 Encourage faculty to spend extra time in the laboratory.
4.3.5 Make professors more flexible about research.
4.3.6 Get more faculty involved in professional psychology.

4.4 Improve faculty-student contact.

4.4.1 Have faculty keep abreast of everything the student does.
4.4.2 Supervise students' use of undergraduate assistants.
4.4.3 Have faculty morally support the students.
4.4.4 Increase contact with faculty.
4.4.5 Have a faculty member keep students informed as to what goes on during faculty meetings.
4.4.6 Have major professors spend time researching their student's major area.
4.4.7 Have major professors keep abreast of everything the student does.

4.5 Improve student teaching.

4.5.1 Give course credit for teaching or researching.
4.5.2 Team-teach more courses.
4.5.3 Let students teach upper division courses.
4.5.4 Have students teach more.
4.5.5 Teach students how to teach.

4.6 Expand student outside research involvement.

4.6.1 Have students work or watch research in other labs for a few weeks or so.
4.6.2 Have students visit more labs.
4.6.3 Allow for graduate students to go elsewhere for a semester.

4.7 Improve student evaluations.

4.7.1 Keep the good students we have now.
4.7.2 Kick the bad students out of the program.
4.7.3 Replace the evaluation system we have now with a multistage process.
4.7.4 Improve the way students are evaluated.
4.7.5 Change evaluation so that a student can be present.

4.8 Improve departmental curricula.

4.8.1 Offer lab courses to old students.
4.8.2 Require more statistics courses to graduate.
4.8.3 Offer a writing seminar.
4.8.4 Offer more courses that are abreast of the current trends in psychology.
4.8.5 Have major professors give students readings to do.
4.8.6 Place more emphasis on research.
4.8.7 Get a clinical program.
4.8.8 Actively seek A.P.A. accreditation every year.
4.8.9 Add more structure to the program with core courses.
4.8.10 Maintain the flexibility of the program.
4.8.11 Develop the strengths or unique aspects of the program.
4.8.12 Broaden the curricula.
4.8.13 Train students in how to be professional psychologists.
4.8.14 Make the program more applied.
4.8.15 Find out what other successful departments do and do that.
4.8.16 Develop an interdisciplinary program.

4.9 Provide for better teaching preparation.

4.9.1 Try new teaching methods.
4.9.2 Have faculty order books for instructors far in advance of the start of class.

4.10 Improve the advisory meeting procedure.

4.10.1 Hold advisory committee meetings early in a student's work for a degree.
4.10.2 Ask students how things are going after their first semester.
4.10.3 Require students to provide a summary of past and future work.

5. Improve departmental productivity

5.1 Improve research facilities.

5.1.1 Have catalogs to look through for equipment.
5.1.2 Hire another lab technician.
5.1.3 Pool faculty equipment interests.

5.1.4 Get better equipment.
5.1.5 Introduce the lab technician to the students and explain what he can do for them.
5.1.6 Make equipment available when needed.
5.1.7 Get better laboratory facilities.

5.2 Improve departmental job placement services.

5.2.1 Give students all help available to find jobs.
5.2.2 Offer a course or packet on how to get jobs.
5.2.3 Send out a questionnaire on job placement.

5.3 Increase student research involvement.

5.3.1 Encourage students more directly in research.
5.3.2 Encourage students more directly in independent research.
5.3.3 Encourage students to work together on research.
5.3.4 Allow students to be more involved in research.

5.4 Increase student participation in research presentations.

5.4.1 Encourage students to go to lunch-bunch.
5.4.2 Have a student only lunch-bunch.
5.4.3 Encourage students to present papers/research.

5.5 Encourage student participation in outside conferences.

5.5.1 Encourage students to go to conferences.
5.5.2 Pay for more than one convention trip per student.
5.5.3 Get a van for conference trips.

5.6 Increase interdepartmental contact and research.

5.6.1 Have more interdepartmental contact.
5.6.2 Have interdepartmental research.

5.7 Increase departmental funding.

5.7.1 Increase funding.
5.7.2 Have students get more grants.
5.7.3 Offer a seminar on how to get grants.
5.7.4 Have faculty get more grants.
5.7.5 Increase the amount of money given by the Graduate Student Association for research.
5.7.6 Solicit the university to provide individual research money.
5.7.7 Have the department provide money for independent student research.

5.8 Improve information about departmental evaluation.

5.8.1 Have our department rated by former students.
5.8.2 Look at the desirableness of each course before deciding to offer it.
5.8.3 Find out the problems of the department or why students drop out or change schools.
5.8.4 Ask students why they are here.
5.8.5 Have critiques of student teachers.
5.8.6 Have our department rated by other schools or departments.

5.9 Improve departmental involvement in publications and conventions.

5.9.1 Make information on how to publish very clear.
5.9.2 Publish more.
5.9.3 Hold paper competitions or conventions.

APPENDIX B

Act Tree Structure for Living Problem

1. Live somewhere without paying rent

   1.1 With person he knows

   1.1.1 With me
   1.1.2 With friends
   1.1.3 With my parents
   1.1.4 Have his parents move here
   1.1.5 With relatives in Norman

   1.2 With person(s) he doesn't know

   1.2.1 In fraternity house
   1.2.2 With person of opposite sex
   1.2.3 Someone with extra room in apartment
   1.2.4 Relatives' friends
   1.2.5 With experimenter
   1.2.6 With religious cult
   1.2.7 With sponsor

   1.3 Public institution

   1.3.1 Salvation army
   1.3.2 Police station

   1.4 Miscellaneous places

   1.4.1 Tent
   1.4.2 Streets
   1.4.3 Outside
   1.4.4 Misc. school buildings
   1.4.5 Car
   1.4.6 Trash dumpster
   1.4.7 Empty house
   1.4.8 Motel laundry room
   1.4.9 Extra dorm room

   1.5 Pay for room only, get board free

2. Exchange goods or services for money or place to live

   2.1 He could exchange services for place to live

   2.1.1 With me
   2.1.2 With someone in town
   2.1.3 Could be Resident Assistant

   2.2 He could exchange goods or services for money

   2.2.1 Sell plasma
   2.2.2 Write book or articles
   2.2.3 Sell paintings or photographs
   2.2.4 Sell candy
   2.2.5 Sell possessions
   2.2.6 Clip coupons to sell
   2.2.7 Have carnival
   2.2.8 Sing or juggle in street
   2.2.9 Collect beer cans
   2.2.10 Form punk rock band
   2.2.11 Give benefit concert for self
   2.2.12 Enroll in work-study

3. Obtain money through other sources

3.1 Try to get loan

3.1.1 From friends
3.1.2 From bank
3.1.3 From loan shark
3.1.4 Through me
3.1.5 From me
3.1.6 From relatives
3.1.7 From private sponsors
3.1.8 From government

3.2 Apply for financial assistance

3.2.1 For housing
3.2.2 Apply for scholarship
3.2.3 From government
3.2.4 From school
3.2.5 Enroll as foreign exchange student

3.3 Ask for money

3.3.1 From other relatives
3.3.2 From my parents
3.3.3 From his parents
3.3.4 Beg on street
3.3.5 Put ad in paper to ask for contributions

3.4 Donations

3.4.1 Monetary donations from me
3.4.2 Of living quarters
3.4.3 Fund-raising projects
3.4.4 Take up collection

4. Ask someone for suggestions or help

4.1 Someone you know

4.1.1 Professor
4.1.2 Friend
4.1.3 Relatives
4.1.4 My parents
4.1.5 Boyfriend's mother

4.2 School officials

4.3 Roommate agency

4.4 Community organization

5. Try to get regulations changed

5.1 on working

6. Change current plans

6.1 Wait to go to school till gets more money

6.2 Take fewer hours

6.3 Go to less expensive school

6.4 Commute from Canada

6.5 Eat less, cheaper food

6.6 Work in Mexico for semester

6.7 Break law so will be deported

6.8 Go home

7. Prepare in advance

   7.1 Apply for citizenship

   7.2 Invest money

   7.3 Establish residency before coming

   7.4 Pay bills so have good credit rating

8. Long shots

   8.1 Look for money

      8.1.1 Gold
      8.1.2 In street
      8.1.3 With metal detector

   8.2 Steal money

      8.2.1 Rob bank

   8.3 Get money through questionable, illegal methods

      8.3.1 Assassinate relatives
      8.3.2 Have old person put him in will
      8.3.3 Sell sister to white slaver
      8.3.4 Get hit by car, sue driver
      8.3.5 Jump off Dale Hall to attract attention
      8.3.6 Get a job anyway
      8.3.7 Form own non-profit corp

   8.4 Get money through luck

      8.4.1 Save child from drowning, get reward
      8.4.2 Win sweepstakes

   8.5 Pray for solution to problem

   8.6 Incur revolution

9. Acts which will not solve problem

   9.1 Commit suicide

   9.2 I could kill him

   9.3 I would plead guilty to his illegal activities

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